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ABSTRACT

School psychologists are often asked to make significant decisions about students, but there has been a lack of research on how psychologists make such decisions. Obtaining the objective that school psychologists make sound decisions is an important goal, which involves training in how to minimize the adverse impact of predictable biases in human information processing under conditions of uncertainty. This paper presents a curriculum to help school psychologists improve their decision-making abilities. The curriculum is based on the work of Hershberger, Part, Markert, Cohen, and Finger (1994) who have conducted research on how medical students go about making important medical decisions. The paper discusses how cognitive phenomenon such as insensitivity to sample size, misconceptions about chance, the tendency to ignore base-rates data, and the use of irrelevant information, can distort decision-making. Examples from school psychology practice are incorporated into the curriculum to illustrate how this cognitive phenomenon can lead to systematic errors in judgment. The curriculum is divided into four units: (1) Discussion of Representativeness Heuristic; (2) Availability Heuristic; (3) Confirmation Bias; and (4) Adjustment/Anchoring Heuristic. The goal is that a semester long seminar about decision-making will improve school psychologists' ability to make important decisions about the students they serve. (Contains 40 references.) (Author/JDM)

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A Curriculum to Improve Decision-Making for School Psychologists

by

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(Science works) "in a rapid reciprocation of guesswork and checkwork, proposal and disposal, conjecture and refutation".

Sir Peter Medawar

"When ideas go unexamined and unchallenged for a long time certain things happen. They become mythological, and they become very, very powerful".

E.L. Doctorow

School psychologists are often called upon to make significant decisions about students. School psychologists make classification decisions, placement decisions, intervention decisions, and many other kinds of decisions during the school day. However, there has been a relative lack of research and training about how school psychologists come to make these important decisions. The purpose of this paper is to present a curriculum to help school psychologists improve their decision-making.

The curriculum is based on the work of Hershberger, Part, Markert, Cohen, and Finger, (1994) who have already done research in this area to assist medical students learning about how they come to make important medical decisions. This curriculum will address how cognitive phenomenon like: insensitivity to sample size, misconceptions about chance, the tendency to ignore base-rates data, the use of irrelevant information and other cognitive phenomenon distort decision-making. In addition, examples from school psychology practice will be incorporated into the curriculum to illustrate how these cognitive phenomenons can lead to systematic errors in judgment.

It is assumed that helping school psychologists make sound decision is an important goal of graduate training. Attaining this objective should involve some training about minimizing the adverse impact of predictable biases in human information processing, particularly under conditions of uncertainty (Tversky & Kahneman, 1971, 1973, 1974). Because decisions about patients, businesses, and students are commonly made under conditions of uncertainty, the presence of cognitive biases has been of interest to investigators. Only recently however, have the effects of cognitive bias on the decision-making by school psychologists been studied (Fagley, 1988; deMesquita, 1992; Davidow & Levinson, 1993; Davidow, 1998). Published studies have demonstrated that (1) decision-making by school psychologists needs further examination (Gutkin & Nemeth, 1997); (2) particular biases can affect specific types of decisions (Hershberger, Part, Markert, Cohen, & Finger, 1994); and (3) some types of academic interventions improve diagnostic-decision making for medical students (Hershberger, Part, Market, Cohen, & Finger, 1993 & 1994). What has yet to be determined are the effects of cognitive training on the decision-making of school psychologists. Research needs to be conducted to determine if training about cognitive biases has positive effects on decision-making by school psychologists. However, before some of this research can begin, a semester long seminar to address cognitive bias needed to be developed. This curriculum, based on the work of Hershberger (1994) and his colleagues was designed to address that need.

The seminar begins with an explanation of how predictable tendencies in information processing can influence decisions made in the school setting, especially in uncertain situations

where estimates of probabilities are required. The seminar is divided into four major units. The first unit is devoted to a discussion about the Representativeness Heuristic. Subsumed under that category are (1) insensitivity to sample size; (2) misconceptions about chance; (3) the tendency to ignore base-rate data; (4) the use of irrelevant information to make decisions. It is estimated that this unit will be covered over 5-6 weeks during which these cognitive biases will be introduced and discussed.

Unit two will focus on the Availability Heuristic. Biases to be discussed in this unit include (1) the tendency to judge easily remembered instances to be more frequent and (2) the illusory correlation. It is estimated that this section will take 2-3 weeks to be introduced and discussed with students.

Unit three will examine the Confirmation Bias. The Confirmation Bias is defined as our tendency to look for information that confirms our prior beliefs. In addition, Unit Three will present and discuss the tendency for clinicians to prematurely select a diagnostic hypothesis without regard to other plausible hypotheses (Voytovich, Rippey & Suffredini, 1985). This section will take approximately two weeks to cover.

Unit four will be designed to present and discuss the Adjustment/Anchoring Heuristic. The Anchoring Heuristic states that people make estimates by starting from an initial value that may be effected by irrelevant variables. Anchoring leads to bias when one does not sufficiently adjust from the first estimate. Over time, this leads to over or underestimates. This cognitive bias will be examined and discussed. This unit will take approximately two weeks to complete.

At the end of the semester there will be a review and a discussion of possible avenues for future research. Included in this discussion will be suggestions for improving decision-making and a survey for students to complete to help make this curriculum more relevant for school psychologists.

SECTION 1

THE REPRESENTATIVENESS HEURISTIC

People make judgments (such as diagnoses) based on the similarity of some characteristics of the target person to presumed characteristics of the person of interest (Medway & Cafferty, 1990; Garb, 1996). Such judgments are often based on the degree of representativeness of the instance. For example, an otherwise normal child with an undetected hearing problem may be misjudged intellectually deficient by a teacher because that child exhibits behaviors that "fit" the teacher's behavior expectation for an intellectually deficient child (Medway & Cafferty, 1990). This way of judging the "fit" between an instance and a prototype can lead to errors because judgments of representativeness are unaffected by several other important factors relevant to making accurate judgments. Estimates of base rates of the various outcomes or categories, sample size, and the reliability of the information need to be taken into account.

Tversky and Kahneman (1974) discussed factors that are related to the representativeness heuristic that affect diagnostic skills. These include base rates, insensitivity to sample size in research and misconceptions about chance. Both psychologists and lay people have a tendency to place too much confidence in the results of studies with small, nonrepresentative samples and grossly overestimate the replicability and generalizability of these studies. Additionally, when a client demonstrates behaviors that better approximate the clinician's notions of what the diagnostic label should look like, the more confident the clinician is of the diagnosis even if there is clear evidence provided to the contrary (Chapman & Chapman, 1967). People also tend to overlook the prevalence of a condition in the population or its base rate. For example, school phobia is more common that autism (Fagley, 1988), consequently, a diagnosis of school phobia should be influenced by the prevalence of school phobia in the relevant population.

Kahneman and Tversky (1973) exposed subjects to brief personality descriptions of several individuals allegedly sampled at random from a group of 100 professionals made up of engineers and lawyers. Here is a thumbnail description that Kahneman and Tversky intended to be representative of an engineer:

> Jack is a 45-year-old man. He is married and has four children. He is generally conservative, careful, and ambitious. He shows no interest in political or social issues and spends most of his free time on his many hobbies which include carpentry, sailing, and mathematical puzzles.

The subjects were asked to assess, for each description, the probability that it belonged to an engineer rather than a lawyer. In one experimental condition, subjects were told that the group from which the descriptions were drawn consisted of 70 engineers and 30 lawyers. In another condition, subjects were told that the groups consisted of 30 engineers and 70 lawyers. The odds that any particular description belongs to an engineer rather than a lawyer should be in the first condition rather than the second condition. The subjects in the two experimental conditions produced essentially the same probability judgments. Apparently subjects evaluated the likelihood that a particular descriptions belonged to an engineer rather than a lawyer by the degree to which the description was representative of the two stereotypes, with little or no regard for the prior probabilities of the categories. Interestingly, research has shown that when no specific evidence is given to subjects, prior probabilities are properly utilized; when worthless, yet seemingly descriptive evidence is given, prior probabilities are not utilized (Kahneman & Tversky, 1974).

SECTION 2

AVAILABILITY HEURISTIC

The availability heuristic is a rule of thumb in which decision makers "assess the frequency of a class or the probability of an event by the ease with which instances or occurrences can be brought to mind" (Tversky & Kahneman, 1974). Generally this heuristic

works well; common events are easier to remember or imagine than uncommon events. By relying on availability to estimate frequency and probability, decision-makers simplify decision-making. However, there are cases in which this general rule of thumb leads to systematic biases. Some events are easier to remember not because they tend to occur more frequently or with greater probability, but because they are inherently easier to think about, because they take place recently or because they are highly emotional.

For example, which is a more likely cause of death in the United States -- being killed by falling airplane parts or by a shark (Plous, 1993)? Most people rate shark attacks as more probable than death from falling airplane parts. The fact is your chances of dying from falling airplane parts is about 30 time greater than from being killed by a shark (Death Odds, 1990, September, 24).

Availability can also lead to biased judgments when examples of one event are more difficult to generate than examples of another. For instance, Tversky and Kahneman (1973) asked people the following question: In a typical sample of tests in the English language, is it more likely that a word starts with the letter K or that K is its third letter (not counting words with less than three letter)? Of the 152 people asked questions like this, 105 generally thought that words with the letter in the first position were more probable. Actually, there are approximately twice as many words with K in the third position as there are words that begin with it.

The Availability Heuristic may also be applied when instances or scenarios are easily imagined. Instances that are more easily imagined are judged more likely. In 1985, Sherman, Cialdini, Schwartzman, and Reynolds examined this issue with an imaginative study. Sherman and his colleagues asked subjects to read about one of two diseases that were reported to be growing in prevalence on campus. Both diseases were referred to as "Hyposcenia-B," but they were described differently depending upon the experimental condition. In the "easy to imagine" condition, subjects read about a disease with symptoms such as muscle aches, low energy level, and frequent severe headaches. In the "difficult to imagine" conditions, subjects read about a disease with abstract symptoms such as a vague sense of disorientation, a malfunctioning nervous system, and an inflamed liver.

Subjects in the control groups simply read the description they were given of Hyposecnia-B -- whether easy to imagine or difficult to imagine -- and judged how like they were to contract the disease in the future. Subjects in the experimental groups, were asked to read about the disease "with an eye toward imagining a three-week period during which they contracted and experienced symptoms of the disease." Experimental subjects were also asked to write a detailed description of how they thought they would feel during these three weeks.

Sherman and his associates found that control subjects were not significantly influenced by how easy the symptoms were to imagine, but experimental subjects were strongly affected. Experimental subjects in the easy to imagine condition thought they were relatively more likely

to contract the disease, but those in the difficult to imagine condition actually rated themselves as less likely to contract the disease than did control subjects who never imagined the disease. Sherman et al. (1985) concluded that imagining an outcome does not guarantee that it will appear more likely but if an outcome is difficult to envision, the attempt to imagine it may actually reduce the perceived likelihood that it will occur.

Vividness of information also affects availability (Nisbett & Ross, 1980). Several studies indicated that a handful of individual testimonials can outweigh comprehensive statistical summaries. As many new car buyers are aware, vivid stories about one person's lemon can quickly erode the confidence that might otherwise come from reading an endorsement in Consumer Reports (Nisbett, Borgida, Crandall, & Reed 1976). As cited by Fagley (1988): "The memory of one student who overdosed in your office in front of you may be so vivid that you overestimate the prevalence of drug use" (p. 312).

School psychologists may overestimate the prevalence of a condition because they tend to see a biased sample of the student population. They have more experience with more troubled students and may overestimate the prevalence of that condition in the population.

SECTION 3

CONFIRMATION BIAS

Confirmation bias refers to the tendency people demonstrate to look for information that is consistent with their beliefs rather than information which opposes it. Klayman & Young Wan Ha (1987) argued that confirmation biases are the result of a "positive test strategy" which serves as a useful heuristic (but) is not always optimal and can lead to serious difficulties in certain situations" (p. 220).

A good example of this "positive test strategy" is the 4-card experiment conducted by Wason and Johnson-Laird (1972). Four cards, each with a number on one side and a letter on the other were presented to the students. An experimenter tells you: "If a card had a vowel on one side (E or K), then it has an even number (4 or 7) on the other side." Which of the cards would you need to turn over in order to decide whether the experimenter is lying? When this question was put to 128 university students, they found that "E and 4" was the most common response (given by 59 students), and "E" was the next most common (given by 42). Most students chose to turn over cards capable of confirming the statement. Only five students gave the correct answer: "E and 7".

As Plous (1993) so aptly puts it: "The rule being tested is "If vowel, then even number," or more basically, If X then Y." The only way to falsify an if-then statement is to find an instance of X and not Y" (p.232).

In 1968, Rosenthal and Jacobsen published a now famous study about the confirmation bias. In that study, grade school teachers were given diagnostic information indicating that 20%

of the students would "bloom" academically in the coming year. As measured by IQ tests 8 months later, these students did improve more than other students did. Remember that the "high achievers" were selected "at random". Rosenthal and Jacobsen called this phenomenon the "Pygmalion effect" after the George Bernard Shaw play, Pygmalion. In addition, there is also evidence of "the student as Pygmalion". Robert Feldman and his colleagues have found that student expectations both of their own performance and of their teacher's performance can influence student-teacher relations and student performance just as strongly as teacher expectations (Feldman & Prohaska, 1979; Feldman & Theiss, 1982).

The availability heuristic may also account for the illusory correlation effect. Informal correlations between particular signs and client symptoms are easily brought to mind by most clinicians. As Chapman and Chapman (1967; 1969) discovered, subjects mistakenly inferred that patients with a particular diagnosis tended to draw figures with certain features; specifically, that there was a correlation between drawing highly detailed eyes and the diagnosis of paranoia. In addition, instances where patients labeled "paranoid" drew pictures with detailed eyes are easier to remember than instances where paranoid patients drew big feet. The stereotype for paranoia is more easily retrievable in the instance where the patient drew a picture with detailed eyes.

The availability heuristic may also be applied when instances or scenarios are easily imagined. Instances that are more easily imagined are judged more likely. Familiarity with "x-type conditions" may make in possible to generate more instances therefore improving the availability and increasing the likelihood of "x" (Tversky & Kahneman, 1973). For instance,

someone who is familiar with ADHD would more easily generate reasons for the attention difficulties than someone would with less familiarity. The expert may overestimate the probability of Attention Deficit Hyperactivity Disorder.

In addition, there is some evidence to indicate that clinicians, once they have discovered evidence for the "problem" tend to stop looking for alternative explanations for the behaviors in question (Yoytovich, Rippey, & Suffredini, 1985). Meehl (1960) found that clinician's Q-sorts of clients stabilizes after only two to four sessions. It is likely that all subsequent data gleaned from the client will be biased by those initial hypotheses. Data consistent with the tentative hypotheses will be given additional credence; data inconsistent with the hypotheses will be disregarded. The fact that the initial hypothesis or diagnosis is merely tentative does not decrease its biasing influence (Ross, Lepper, Strack, & Steinmetz, 1977).

In addition, theoretical orientation can bias decision-making. The adherence to varying theoretical orientations contributes additional variability and inconsistency to decision-making. Belief in one theoretical orientation (i.e. psychodynamic) may lead a practitioner to view a behavior (bedwetting, for example) as an indicator of other, possibly deeper, intrapsychic difficulties. Belief in a different theoretical approach (i.e. behavioral) may lead to quite a different diagnosis and treatment of the same phenomenon. It should also be noted, as Plous (1993) so correctly points out, that researchers are prone to confirmation biases and self-fulfilling prophecies (Jenkins, 1981). Rosenthal and Fode (1963) led a dozen experimenters to believe that they would be working either with "maze-bright" rats or "maze-dull " rats, when in reality, these labels were assigned at random. Each experimenter was given five rats to work with

and was asked to record how the rats performed on 50 trials of a maze-running task.

Averaging over all 50 trials, Rosenthal and Fode found that "maze-bright" rats were correct 50 percent more often than "maze-dull" rats. Thus, even though expectations had been induced at random, experimenters found the results they expected to find. It may also be the case that school psychologists find what they "expect" to find in their referred students.

SECTION 4

ADJUSTMENT/ANCHORING HEURISTIC

The anchoring heuristic states that people make estimates about phenomenon by starting from an initial value that is adjusted to yield a final answer. Anchoring leads to bias when one does not sufficiently adjust from the first estimate. Over time, this leads to over or underestimations.

An example of the anchoring effect, drawn from the daily experience of most school psychologists, is one where school psychologists are provided with initial estimates that may bias subsequent judgments. According to Fagley (1988), "Referral information, or previous test data may be available that may unduly affect the ultimate outcome of an assessment by providing a different 'starting point', in a way analogous to the anchoring of numerical predictors" (p. 317).

The best known experiment to describe this anchoring heuristic was conducted by Tversky and Kahneman in 1974. In their experiment they placed subjects in front of a wheel of fortune. The perimeter was lined with an array of numbers, and after the wheel was given a spin, the needle lands on 65. The subjects were then asked a question: "Is the percentage of African countries in the United Nations greater or less than 65?" Subjects were fairly sure the percentage was less than 65.

The next question asked was: "What is the exact percentage of African countries in the United Nations? After some reflection, most subjects gave a number around 45.

Other subjects are tested, only this time the wheel of fortune stops at 10. The subjects are asked: "Is the percentage of African countries in the United Nations greater or less than 10? Subjects were fairly sure the percentage was more than 10.

The next question asked was: "What is the exact percentage of African countries in the United Nations? After some reflection, most subjects gave a number around 25. Tversky and Kahneman explained this phenomenon in terms of "anchoring and adjustment", that is, the insufficient adjustment up or down from an original starting value, or "anchor".

O'Reilly and Northcraft (1986) studied school psychologists and found that whether they were told a child had been referred for gifted or learning disability placement completely determined ratings of the appropriateness of the various placements. These responses occurred even though the data provided to the school psychologists about the child were identical.

Friedlander and Stockman (1983) found that experienced clinicians demonstrated significant anchoring in their prognosis estimates of a moderately disturbed client. However, no anchoring effects occurred in judgments of a more seriously disturbed client. The authors concluded, that for trained clinicians, judgments were not a function of the subject's characteristics but were related to the subject's perceived level of disturbance. For a more troubled client the adjustment of a judgment may be less extreme than for a less troubled client.

Conversely, Quattrone and his associates (1984) solicited exact numerical estimates after first asking whether the number of Beatles records that had made the top 10 fell above or below 100,025 albums, whether the average temperature in San Francisco was greater of less 58 degrees. Quattrone's research team found that absurdly high anchor values worked just as well as more plausible anchor values. From this result, they concluded that anchoring is a robust phenomenon in which the size of the effect grows with the discrepancy between the anchor and the "preanchor estimate" until the effect reaches an asymptotic. If true, these findings suggest that negotiators, advertisers, politicians, and other persuasion specialists will generally be most successful by staking out extreme initial positions.

The effects of anchoring and adjustment are pervasive and extremely robust. Many studies point to the finding that people adjust insufficiently from anchor values, regardless of the judgment. Despite the many decision-making errors school psychologists and human beings make, there are several methods to improve decision-making under conditions of uncertainty. These methods will be presented next.

IMPROVING THE DECISION-MAKING PROCESS

Elstein, Shulman & Sprafka (1978) list several reasons why clinical judgment is flawed. First, diagnostic problems are usually formed by formulating a finite set of alternative solutions and testing them. People tend to be misled by these alternatives because they focus on irrelevant features of the problem, or because they are guided by faulty biases and expectations. Second, clinical reasoning is inaccurate because human clinicians tend not to think probabilistically or, if they do, their weighting of certain data is inappropriate. Third, clinicians tend to collect too much data on the belief that such redundancies improve their decisions, whereas, in point of fact, these data overload the clinician's cognitive capacity to interpret those data (Sisson, Schoomaker, & Ross, 1976). Finally, studies about people's ability to revise subjective probabilities (Kahneman & Tversky, 1973; Slovic, Fishoff, & Lichtenstein, 1977) have shown that people are exceedingly poor and non-optimal decision-makers.

Goldberg (1968) summarized typical findings about clinical judgment and concluded: a. they tend to rather unreliable; b. only minimally related to the confidence and to the amount of experience of the judge; c. relatively unaffected by the amount of experience of the judge; and d. rather low in validity on an absolute basis. McDermott's (1980), Gredler's (1984), deMesquita's (1992), and Davidow's (1998) findings in the school psychology literature are consistent with Goldberg's conclusions.

Despite these dire conclusions, there are some things you can do to improve decision-making. Plous (1993) suggests first, don't be misled by highly detailed scenarios. The very specificity that make detailed scenarios seems representative also lessens their likelihood. In general, the more specific a scenario is, the lower its chances are of occurring.

Second, pay attention to base rates. Base rates are particularly important when an event is rare or common. For example, because the base rate is so low, many talented applicants never get admitted to graduate school. Conversely, because the base rate is so high, many unskilled drivers are awarded a driver's license.

Third, chance is not self-correcting. A run of bad luck is just that: a run of bad luck. It does not mean that an equivalent run of good luck is bound to occur, and it does not mean that things are doomed to stay the same.

Fourth, don't misinterpret regression toward the mean. Even though a run of bad luck is not necessarily balanced by a run of good luck, extreme performances tend to be followed by more average performances. Arkes (1981) suggested other techniques to minimize bias in decision-making. He suggestions included: considering alternative hypotheses for a long period of time, use base rate information, and decreasing reliance on memory by taking notes.

SUMMARY

School psychologists are often asked to make important decisions about students. There

has been a lack of research and training about how school psychologists come to make these important decisions (Gutkin & Nemeth, 1997; Davidow & Levinson, 1993; Fagley, 1988). The purpose of this paper was to present a curriculum to help school psychologists improve their decision-making.

Research has indicated that decision-making and clinical judgment is flawed for many reasons (Hershberger, Part, Market, Cohen, & Finger, 1993; Elstein, Shulman & Sprafka, 1978). Some of those reasons are: limiting the number of alternative solutions that are examined; focusing on irrelevant features of the problem, difficulties with probabilistic thinking and overloading the clinician's cognitive capacity with too much data (Elstein, Shulman & Sprafka, 1978; Sisson, Schoomaker & Ross, 1976).

A curriculum was developed to help deal with these difficulties. In that curriculum four major decision biases were examined. They were the Representativeness Bias, the Availability Bias, the Confirmation Bias, and the Anchoring/Adjustment Bias. At the conclusion of the curriculum several alternatives were presented to improve the decision-making process. Some suggestions included: limited belief in highly detailed scenarios, considering base-rates, improving one's understanding of probability, considering alternatives for a long period, and decreasing reliance on memory.

It is hypothesized that a semester long seminar about decision-making would improve school psychologists' ability to make important decisions about the students they serve. Research could be conducted to examine this hypothesis and study how school psychologists make decisions.

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